802.11 QoS Overview

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IEEE Plenary Meeting – Nov 08 Dallas, TX

Disclaimer

This presentation is not a highly detailed technical presentation but a crash course aiming to provide - prior to the joint meeting with the 802.11 WG- a basic understanding of the QoS mechanisms currently defined in the IEEE 802.11-2007 specifications

Abbreviations & Acronyms

ADDTS	add traffic stream
AIFS	arbitration interframe space
AIFSN	arbitration interframe space number
AP	access point
APSD	automatic power-save delivery
BSS	basic service set
CSMA/CA	carrier sense multiple access with collision avoidance
CW	contention window
DELTS	delete traffic stream
DIFS	distributed (coordination function) interframe space
DLS	direct-link setup
EDCA	enhanced distributed channel access
EDCAF	enhanced distributed channel access function
EIFS	extended interframe space
HCCA	HCF controlled channel access
HCF	hybrid coordination function
MAC	medium access control
MPDU	MAC protocol data unit
NAV	network allocation vector
PIFS	point (coordination function) interframe space
PS	power save (mode)
QoS	quality of service
S-APSD	scheduled automatic power-save delivery
SIFS	short interframe space
SP	service period
STA	station
TXOP	transmission opportunity
U-APSD	unscheduled automatic power-save delivery
WMM	WiFi Multimedia

802.11 MAC Legacy Access Protocol

802.11 MAC Access Protocol

1. Distributed Coordinated Function (DCF)

   Contention access

   Based on Carrier Sense Media Access /Collision Avoidance (PHY Carrier Sense & Network Allocation Vector)

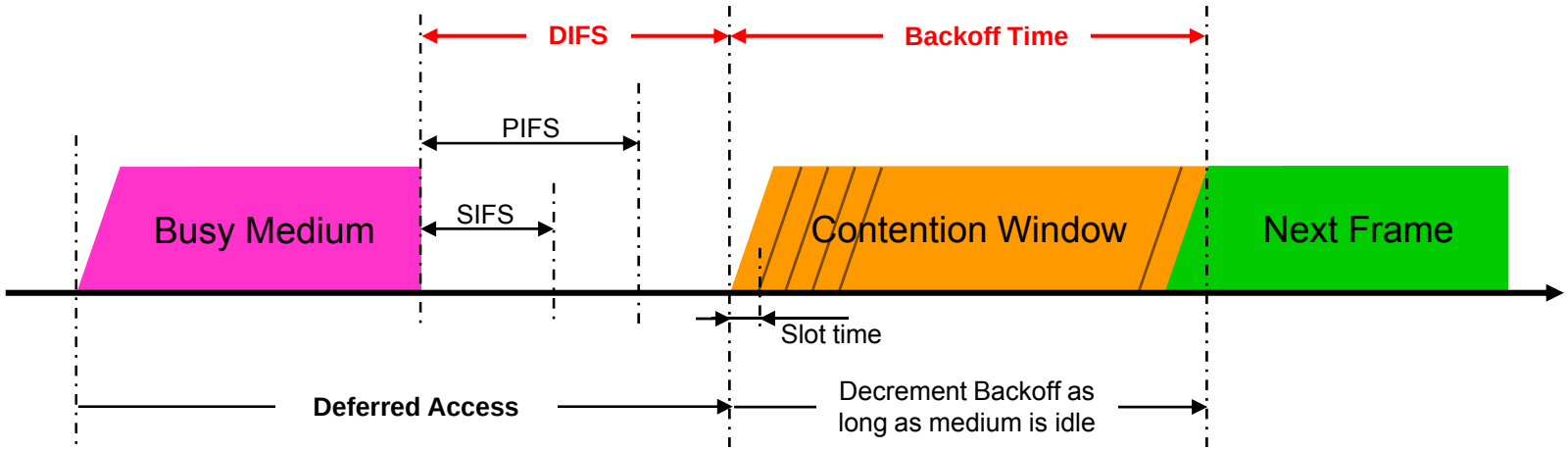
2. Point Coordinated Function (PCF)

   Contention Free access:

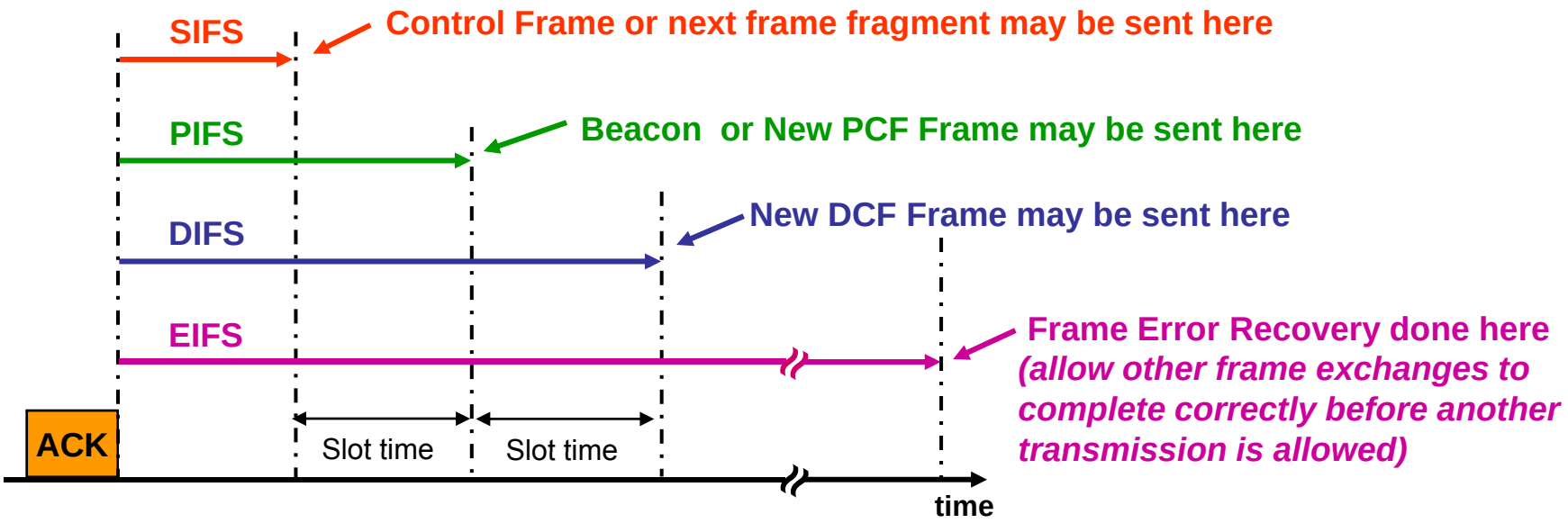
   Access Point (AP) coordinates access for AP and STA transmissions

   Optional !!!

DCF Contention Mechanism

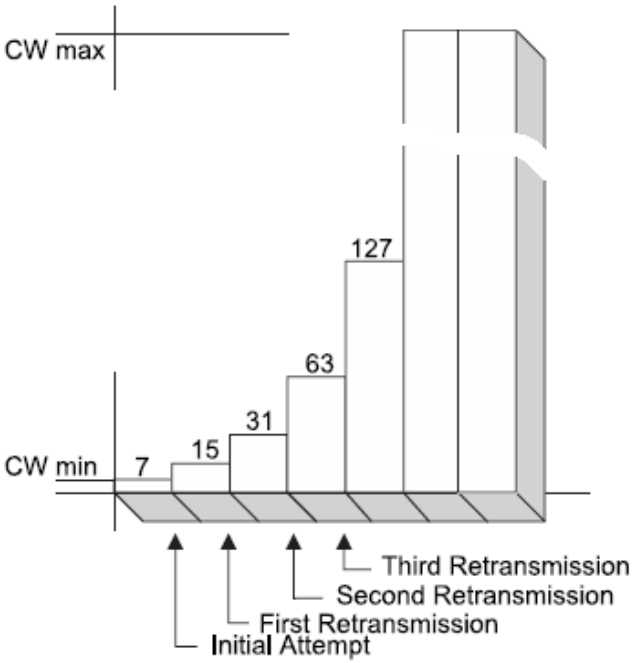


Interframe Spacing in 802.11



	802.11b	802.11a	802.11g
SIFS	10 µs	16 µs	10 µs
Slot time	20 µs	9 µs	9 µs
PIFS (= SIFS + 1 x Slot time)	30 µs	28 µs	19 µs
DIFS (= SIFS + 2 x Slot time)	50 µs	34 µs	28 µs

Random Backoff Time



Backoff Time = Random() * SlotTime

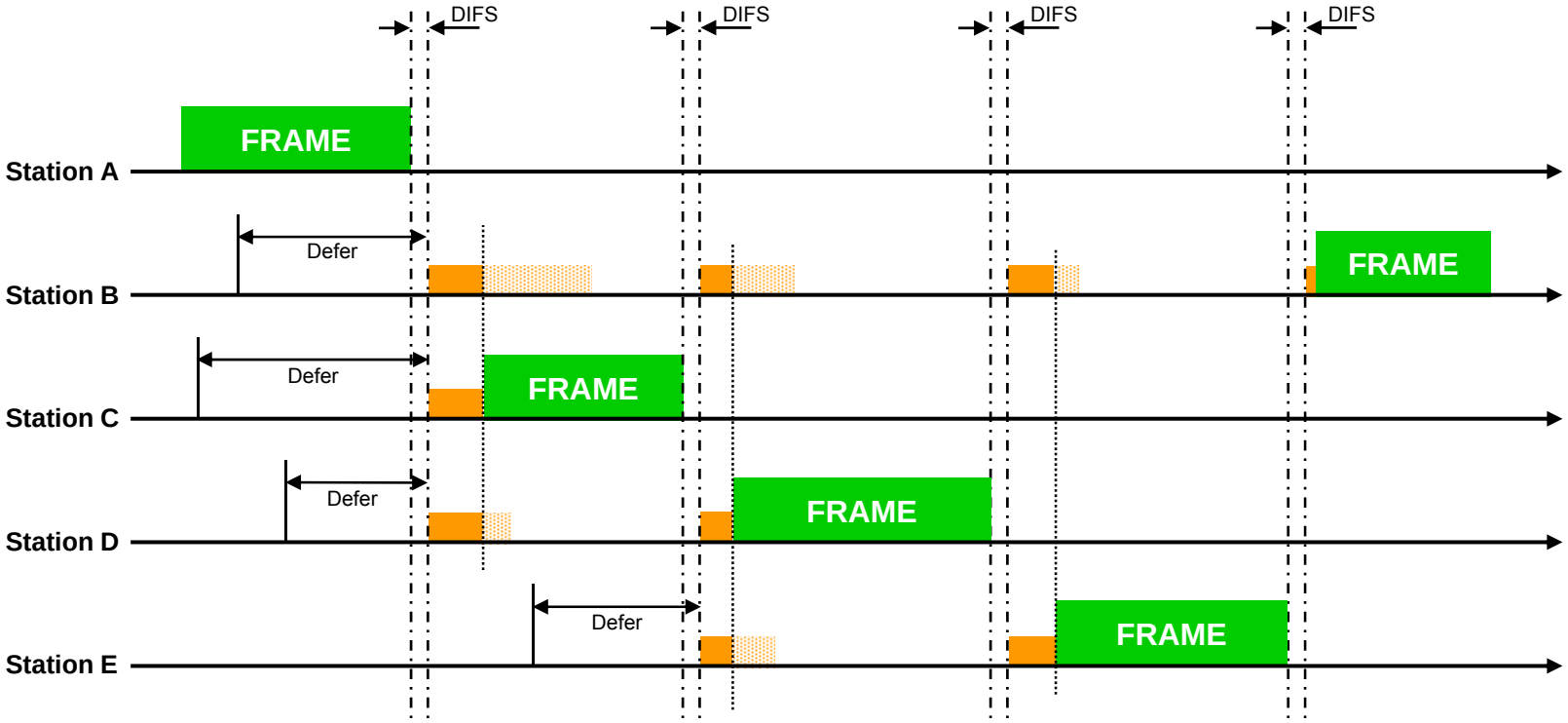
Random() = Pseudo-random [0,CW]

CWmin =< CW <= Cwmax

CW:

- Incremented by 2n-1 on each retransmission
- Reset after successful Txm

Distributed Coordinated Function



PCF: Point Coordinator Function

- Poll and response protocol to eliminate the possibility of contention for the medium.
- A Point Coordinator (PC) - *always located in an Access Point* - controls the PCF
  - To operate in PCF, stations register to the PC
  - PC regularly polls the registered stations for traffic while delivering traffic to theses stations.

PCF Operation